

Information System for Land Administration: Experiences in the Amhara Region

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1. Introduction

1.1 Background

A system for administering properties and holding rights of land, land values, land use and other land-related data is an indispensable tool for land administration and for sustainable management of land resources. Any land administration system undertakes registration of landholders and their use rights. In due course, land data is generated which is implemented in the land administration pilot projects by employing high tech surveying equipments. So EPLAUA developed a system to be implemented at a pilot project level.

In the last three years the Amhara National Regional State's Environmental Protection, Land Administration and Use Authority (EPLAUA) began to implement the land administration system. The main purpose of establishing the land administration system is to enhance security of user rights. As it is prescribed in the land law it will close the open ended tenure arrangement that has caused uncertainty with respect to length of possession rights and ability of farmers to accumulate benefits from long-term investments. It will also support agricultural production for food security. In this connection the experience of other countries tells us that there is no land administration that does not conduct registration of user rights, land value and land uses. So, whatever method is employed surveying and registration of real property and holding rights is an indispensable task of the land administration system. Although this is the theoretical aspect of land administration system, there was no practical experience on how to handle and implement the overall operation of land administration activities even at the national level. In addition there were no appropriate technical staff at the commencement of the implementation of the regional land policy and land law. In order to alleviate the underlying problems, piloting a Land Administration System was found to be an appropriate measure. As a result, a pilot project came into operation. In this pilot land administration project there are about nine components including information, registration, surveying and mapping. The project kebeles include one in East Gojjam Zone - Addisna Gulit Kebele - and one in South Wollo Zone - Girraddo Enddod Ber Kebele. In both pilot Kebeles, information is given to the farmers and Land Administration and use committees are formed at kebele and sub-kebele levels. The committees participate in defining the boundaries of kebele and sub-kebeles, common lands, organizations' holdings, and the registration of individual holdings.

The technologies used in the pilot kebeles for surveying and mapping real properties are traditional parcel measurement combined with modern equipment for describing parcels.

In the later case Total station is deployed for the surveying of kebele boundaries, common land, organizations' land and individual farmer's holdings. The operation of surveying and registration was done by surveyors who are assigned one for each pilot kebele at EPLAUA level, with supportive staff from Wereda teams. The survey data at the kebele level is transferred into the Book of Register and, at the Wereda level, the registered information is supposed to be entered into the ISLA. So far, in both pilot kebeles, the land data of more than 1,109 holders has been transferred into the Book of Register and 1109 household heads have got their title books, together with site maps showing the size and shape of each parcel. This represents nearly two-thirds of the household heads who are landholders in the two pilot kebeles.

1.2 Rationale for computerization of the land administration system

In the Amhara Region cadastre-based registration of real property and holding rights commenced during the last three years at the pilot level. Data collection has already been completed in those two pilot kebeles. In the meantime, we learn that a huge land-related data has to be collected and administered region-wide. Hence, a system for administering real property and holding rights is an important tool that would facilitate data storage and its retrieval and above all rapid access to a large data set. Regarding the amount of land data, it is estimated that there are 4.5 million properties and about 16 million parcels held by 3,058,000 household heads throughout the region. All these data of real property together with the holding rights requires a vast storage place and makes the archiving and management of data difficult, thereby hindering the provision of better service to landholders. On the other hand, if an information system for land administration is in place data can be stored in the computer in such a way that it can be quickly and effectively retrieved and quickly updated. On the other hand, computerized land information system requires reliable land records in order to maximize the benefits of the system. Therefore, a computerized land information system is introduced in Amhara Region. Computerizing the land registration system has many benefits. Just to mention some, it facilitates planning, generates data useful for taxation, facilitates updating of land transaction data, enhances security of tenure, access to credit, map production and enables resolution of land-related disputes.

Concerning the need of computerizing the information system for land administration Zwart 1990 pointed out that the opportunity to overhaul the system should be considered. In this connection a concerted effort has been made in reviewing a number of issues, both technical and institutional, that lie in the way of developing and implementing computerized cadastre system. Furthermore, Zwart noted that by far the most important issue is the realization of cadastre as a tool of effective land administration. In order for the cadastre to achieve its primary objective in optimizing the respect of user rights and the better use of the land, it must serve as an information system. Information about land should be treated as a corporate resource and its use must be maximized. Therefore, it is the computerization of the information system for land administration that offers us the opportunity to achieve the intended objectives mentioned above.

Regarding computerization, Dale (1993) explained that cadastre deals with two resources - land and information. He noted that computerization facilitates the better use of both by allowing more people to know more about the land and the problems and opportunities associated with its use. While much can be achieved through improved manual methods of data handling and by focusing the attention of administrators and the public whom they serve on the related nature of many land related problems, it is computerization that is the most effective catalyst for change. Furthermore, he stressed that pressure on land is growing in every community both through population growth and through environmental and ecological change. To monitor, plan for and manage that change, better information is needed. To this end he stated that it is computerization of cadastral records that offers vital support for such activities.

Contrary to the advocates of computerization of information system for land administration there are opponents justifying their arguments that in many countries, investment in information technology has been driven by each organization's internal need to improve the management of its own resources. In reality, they suggested that computerization does not necessarily improve efficiency – as there is no benefit in computerizing the mistakes and errors of the past. Of course, the opponents of computerization did not deny that computerization can act as a catalyst to improve existing procedures and has often led to external benefits through the provision of better service to the intended beneficiaries. Although computerization of ISLAS may be costly in terms of financial resource and skilled man power requirement its merits and demerits should be assessed from users' perspective. Concerning the issue of computerization, Dale advised that there is often greater cost in doing nothing more than investing in reform.

Therefore, the rationale in computerizing the information system for land administration is to facilitate land registration system that is possible to administer land and holding rights, to update data as a result of use right transfer due to inheritance, gift, reallocation etc. Computerized land registration system will also facilitate planning purposes, generate data to be used for taxation, credit market, and map production and reduce land-related disputes. Above all the rationale for computerization of ISLAS in Amhara region is relative to the amount of data to be collected and managed region-wide, which is practically impossible without computerization. At the same time it is computerization that finds the solution for the requirement of vast area for data storage and facilitates its retrieval.

In other words the rationale for computerization of ISLAS in Amhara region is to secure land holding rights by the provision of secondary level certificate of holding together with maps showing the shape and size of parcels and so as to facilitate data storage and its retrieval, which are the major benefits in the context of Amhara region.

2. Objectives

The main objective of computerization of information system for land administration in Amhara region is to reduce duplication in the entering, storage and retrieval of information, accommodate increases in registration of real property and holding rights, simplify the updating of data and facilitate the compilation of information and reports that are impossible or very cumbersome to produce using the manual systems. Therefore the objective of this paper is to present the experience of Amhara Region EPLAUAs information system for land administration.

The strategy of ISLA

After the decision to computerize the cadastre and to develop a land information system a number of actions has been taken step by step. According to the strategy, attention was first given to capacity building for the appropriate staff so as to develop their knowledge in IT and make them understand what is required of the system. The establishment of an IT team has dual purposes. On one hand, it can facilitate the process of ISLA development; on the other hand, it is an opportunity for the team members to develop their skill in learning by doing. To this end, at EPLAUA level an IT team with four members together with the system specialist was formed. The team comprised two experts from Land Administration Department, one GIS expert from GIS and remote sensing team, the fourth one is the system development expert who was secretary of the IT team.

In the selection of IT team members, attention was given to those who have technical background in IT. The technical IT team had regular meetings to facilitate the development of the ISLA. They are responsible for administering the initial installation and usage of the ISLA. This team is also responsible for training EPLAUA and personnel in administration and usage of the IT system.

Prior to rolling out to pilot the Weredas, an initial training program was recommended to enable the team members to act as system administrators for the ISLA. Thus, one junior computer expert who is working in the Department of Land Administration had a three-month training in Addis Ababa in June and August 2005 on the following subjects:

- Microsoft server
- Microsoft visual Basic Net (dot-net)
- Microsoft SQL server Net (dot-net)
- Land Administration related issues.

According to Dale and McLaughlin (1999), land information systems are required by a variety of users, ranging from agencies at all level of government to existing or prospective land owners to lawyers, surveyors, valuers, real estate managers, and retailers. In line with this, the Amhara region EPLAUA has identified both the potential users of computerized land information system and the uses of parcel-based data. Concerning potential users, they are mainly rural landholders, agricultural investors, courts the institution in charge of land tax collection, financial institutions such as banks

and Amhara Credit Service Institute (ACSI), the central government of Ethiopia and Amhara National Regional State. According to UNECE report (HBP/1998/8.para.5) on the social and economic benefits of good land administration, land registration is a component of good governance; land registration is the source of land-related information that can be utilized by the state to maintain the social welfare of landholders. Parcel-based data can be used for the regulatory aspect of land administration, development, environment, tenure security, assessed production value, improve land taxation, facilitate the updating of data that will likely take place due to land transactions.

3. Hardware and Software Requirements

In the strategy, it is emphasized that implementing a new computerized system requires new hardware, software and network infrastructure. This is to set up a proper networked environment at EPLAUA where data can be shared within the organization. According to Dale a corporate strategy should be developed so that potential users of the system especially other government organizations and parastatal bodies can gain access to the system. This is dependent on the communication facilities. In the context of Amhara Region, the existing communication facilities do not allow online access by Wereda offices and EPLAUA. Therefore, it is important to keep in mind that all entries and updates of data must be done at the source, that is at the Wereda office. Data will only be available at the EPLAUA office for reporting purposes. One should understand that the current ISLA is intended to be functional only in the two pilot Weredas; hence, other governmental organizations do not have access to the ISLAS currently.

In the strategy the required hardware and operating systems have been identified. The selection of hardware and operating systems was done considering the fact that EPLAUA has installed PCs with Microsoft Windows. Although there are alternatives such as Linux and UNIX, both of these are found to be more complex to set up and administer than the corresponding Microsoft system. In addition, there is limited expertise in these softwares in Ethiopia.

Concerning the database, Oracle and Microsoft with its SQL Server, have been considered. However, they have their own pros and cons; Oracle is usually regarded as a more complex and high end database. It is also more complex to install and administer, which makes it unsuitable for a mass installation over 106 Weredas found in the region. On the other hand, SQL Server satisfies the requirement that it can be closely connected to the operating system, which makes it easy to install and administer. It is fault tolerant. It can also accommodate data on up to 50 million parcels, which is greater than the expected number of parcels in the region. For these reasons, the Microsoft SQL server was chosen for the database.

Regarding the development tools, the two major powerful ones in the market such as java and Microsoft Visual studio were considered. Finally, it was decided that ISLA should be developed using SQL server and Microsoft Visual studio for the following reasons:

- Good compliance between the software (Windows, SQL Server and Visual studio);

- Possibilities for sharing experience
- Training available in Ethiopia
- De facto standard.

The needs and requirements defined by time frame are the following:-

Immediate short term

- Networking equipment to create a small local area network (LAN) – not implemented due to financial constraint,
- Additional PCs for the IT team

Short Term

- Development/test, production (ISLA database) and file servers - not implemented,
- Equipment for initial Wereda implementation (PC, UPS, printers, LAN, Modem) - all supplied except LAN and Modem,
- Phone lines and Modems for data communication- not installed and purchased due to budget constraints.

In the longer term it is planned to acquire the necessary facilities for the installation of this size. This should include a proper server room with backup power.

3.1 The strategy in developing and implementing ISLA

Land Administration project in the pilot Kebeles has started to register landholding rights since 2003. Hence, it is important that user rights, together with land information, are registered in a computerized system, ISLAS, and that access to the data is given both to the Wereda and EPLAUA offices. For the successful implementation of ISLA three major tasks have been performed:

- Developing ISLA
- Creating an organization to maintain ISLA
- Creating an organization to implement and support ISLA.

3.2 Developing ISLA

Developing ISLA is done in-house with the leading role played by the system development expert in co-operation with the land administration and GIS expert. Initially the system was seen as an interim solution for the pilot project and for initial data capture. With growing needs in the future it might be necessary to replace the system because at times the data is more important than the system itself. Therefore, in developing the system due consideration has been given that the data is correctly stored and formatted and that it can be converted to any desired format.

In the system development process two governing documents -- system specification and system architecture -- have been prepared and are being used. These documents describe the contents and functionality of the system

3.3 System specification

A system specification served as an input for the development (programming). It describes the reality and how objects relate to each other. For instance, a parcel can be identified by the holder's ID. It is important that the system specification fulfils the requirements of the system. If there is mismatch between the system specification and the requirements of the system it will be difficult to correct it afterwards. So it is important that all involved parties take part in the specification and address any discrepancies. For this purpose frequent discussions between a team of experts and the top management took place.

The scope of the system specification describes what is contained in the system and what function the system ought to perform. In dealing with the details of system specification two central objects (in Amhara Region ISLA) are identified and agreed upon. These are Real Property and individual holder. The definition of terms and their description will be presented separately.

4. Issues and Opportunities

The opportunities to develop the LIS have increased with the recent advances in information technology, moves towards constructing national spatial data infrastructure and the creation of national information services. While the function of a LIS is to support the management of real property, including the physical earth and all things attached to it. The function of a LIS is to underpin this process.

When implementing an IT system any issues and opportunities that can contribute to the success of the system have to be examined. Some of the issues and opportunities that are important and addressed by EPLAUA are the following:

- The system supports registering data about properties and holding rights which are the core business of Land Administration.
- ISLA specification fulfils all that was expected and required of the system to perform.
- The data in the system is to be updated in the event of various transactions such as when parcels are sub-divided and consolidated, in cases of inheritance, gifts, and rental contracts. Moreover, end users (landholders) have taken interest in getting the title deeds attached with their parcel map. It is essential that updating the data in the system emanates from the request of the landholders. As long as the land users show genuine interest in that, the system will be updated.
- The system has been firmly established in those pilot project Weredas.

- The GIS service in EPLAUA has the capacity to support the system technically and assist the users at the Wereda office. This is an opportunity for the sustainability of ISLA, by making the Wereda office feel confident in using the system (pilot projects).
- There is an interest within EPLAUA from the stand point of management, Land Administrators, land use experts, and environmental experts. Since the system is implemented within EPLAUA, everyone working in technical Departments has access to the system from their own PC and know how to extract data. If the staff do not know how to use the system, they may become alienated from the system, and not fully understand the issues in order to a take decision.
- There are potential users of the system such as banks, tax authorities, etc. Nowadays, the institution in charge of land tax collection is making use of the land data for the determination of reasonable tax.
- The last and the most important success factor is that a system such as ISLA needs technical staff to develop and maintain the system in track and that application support staff have full knowledge of ISLA and land administration issues. They serve to link to users at Wereda offices and EPLAUA. We have also trained users who can give assistance to get ISLA started.
- User's guide and system administrator's guides are in place.
- There are seven surveying crews (one crew consists of three surveyors) well trained in surveying and mapping and equipped with instruments. This is an opportunity to extend cadastral surveying into another Wereda, beyond the existing two pilot Kebeles.

5. Current Situation

5.1 Extent of ISLA application in the two pilot Weredas

It is understood that implementing a computer system is not as easy as just installing an application. It is a whole new way of working and the system and organization must both be developed so that they can together maximize the benefit.

Concerning ISLA functional requirement in the first phase, it is supposed to perform the function of initial registration of property and its holders, such as information about holder(s) and their spouse(s), and rental agreements, and easement.

Transfer of holding right and the reason for transfer of holding right are registered in the system. Gift, inheritance, reallocation, consolidation or sub-division of parcel, and a new rental agreement are valid reasons to undertake transfer of holding rights. However, although ISLA incorporates all these major land transactions, currently surveyed data has not yet been entered into the system. This was due to the workload of the Wereda EPLAUAT and shortage of skilled manpower. Currently, the ongoing registration of real property and the holding right in cadastral survey (in pilot kebeles) uses traditional methods.

The system has been developed, tested and accepted by EPLAUAT. For the system implementation the following items have been supplied and major activities have been accomplished:

- Hardware for the two pilot Weredas have been delivered and installed;
- Facilities at the Weredas have been prepared (office);
- ISLA IT team has been trained and is able to support the installation;
- Users are trained at the Wereda (on-the-job-training);
- Users are trained at the EPLAUA (on-the-job-training).

5.1.1 Authorizing data

Authorizing data into ISLAS. To confirm a property or holding right approval of two Wereda officers is necessary. No data is allowed to be written into the holding book before public hearing, then recorded and approved or verified by EPLAUAT officer.

5.1.2 Data transfer to EPLAUA

In the implementation of ISLA, the surveyed data that has already been gathered and entered into the system. In the process of cadastral surveying central co-ordinates are registered for each parcel so as to facilitate producing a map.

Currently, surveying data is brought to EPLAUA for map production as Weredas don't have full capacity to undertake surveying with the help of high tech instruments and produce maps. So far there are no conflicts between the textual data entered and the GIS data at EPLAUA.

In the system architecture, a technical solution is proposed concerning what software to work with and how data is transferred from the Wereda to the EPLAUA.

Currently, the communication facilities do not allow online communication between the Wereda offices and EPLAUA. Thus, all entries and updates of data are proposed to be done at the source, i.e., Wereda offices. Data would be made available at EPLAUA office only for reporting purposes. Although no surveyed data is available at the moment, it was planned that data will be transferred on file from Wereda to EPLAUA. This will be done over the phone, through disks, CD or Tape. So far, this was not practiced because Weredas have not entered surveyed data into ISLA. What is available at the Wereda office PCs is the surveyed data in the Excel sheet.

5.2 Strategies to extend the system into other parts of the region

In the first phase a basic data capturing system that is easy to use was designed in cadastral surveys. Priority has been given to a functioning system in two land administration pilot kebeles which focused on holding rights and other land-related data. The system should be extendable with new functionality in the future as the need arises.

ISLA has not been fully developed. It has been tested and taken into operation at the Wereda and EPLAUA level. In due course, new needs will arise and that there may be bugs that need to be corrected. For instance, the parcel maps do not show the relative location of a particular parcel from either a kebele or sub-kebele. Therefore, issues like this one and others require further development of the system. This is the responsibility of the EPLAUA IT team. For the team to take such responsibilities their knowledge and skill need to be upgraded.

ISLA has been developed for registering and maintaining data on properties and holding rights. The sources of data for ISLA are both traditionally collected information and cadastral surveys. At its initial stage the system does not contain functionalities such as mortgage, expropriation, assessed production and market value, security document printout and online access to other interested parties (banks, ACSI, etc.).

Concerning the strategies to expand ISLA to other parts of the region, one approach is extending ISLA with new modules to fit this functionality. This depends on the core content (property, parcel, holder, etc.) and architecture. When developing a new system, one should bear in mind that it does not mean loss of data. Data can be transferred from ISLA to the new system. If the development of a new system is mandatory the procedure is to prepare a very detailed specification that builds on the future requirement and experiences gained from ISLA.

There are two possibilities to expand ISLA to other parts of the region. On the one hand there exists a huge data collected manually in 106 Weredas waiting to be entered into the system regardless of other requirements. In this regard, one can say that the data is more important than the system itself. On the other hand, for the provision of secondary level title deed, there are enough surveying crews to conduct field surveys with the help of equipment. In the cadastre surveys undertaken in the two land administration pilot Weredas there were only two surveyors at the regional level. But now we have seven survey crews who are well trained and some of them had a chance to get international training for six weeks in Sweden. At the moment these survey crews are based at the regional level. In the future they will be assigned at least at the Zonal level where the priority Weredas can be selected to undertake cadastral surveys. This does not mean that ISLA can be expanded to many Weredas at once. There are at least two limiting factors in this regard. One is the supply of expensive survey equipment such as GPS, total station. The other limiting factor is shortage of qualified personnel who can undertake cadastral survey in those newly selected Weredas. Therefore, the expansion of ISLA to other parts of the region should be regarded as a step by step process. On the other hand the functionality of ISLA does not mean that it is limited to data from cadastral survey; it can also be used for data that is collected manually. In this case what is required is training of Wereda staff to be able to enter land data into the system and management of supply of hardware.

6. Constraints and Opportunities

6.1 *Issues and constraints in running ISLA*

According to Dale and McLaughlin(1988), the fundamental objective of cadastral system should be to improve the management of land by treating land information as a corporate resource. The benefits that come from improved land information products and services are diverse and affect many people. Conversely, defects in existing cadastral systems add to the costs that must be borne by the user community. Return on investment can be lost through delays in the issuance of land holding right certificates. Inadequate land records can lead to lost opportunities for collecting land or property related taxes and can result in lost revenue through their incomplete collection. Although such costs are extremely difficult to quantify, they are nevertheless real and should be taken into account when assessing the merits of computerization and cadastral reform. There is often greater cost in doing nothing than in investing in reform.

In addition, in as far as what type of land information data should be collected in any broadly based multi-purpose cadastral system, Dale and McLaughlin (1999) state that the system must produce information that satisfies its users. There should be a sort of discrimination between what it is necessary to know for the immediate purpose of planning and land administration, and what might at some time in the future prove to be useful to know but which at present is not essential. Furthermore, they suggest that the list of possible features and the attributes of parcels that may be recorded within any land information system can be effectively limitless. But the underlying issues become the cost and efficiency and what the users rather than the data producers require. However, there is a great need in investing on information technology many times its progress is constrained more by institutional issues than by those of a technical nature (Dale and McLaughlin 1999). In this connection they stress that in some countries, especially among the poorer nations, the telecommunication infrastructure is unable to support networking between different sites thus preventing the sharing of data and their treatment as a corporate resource.

This is also true in the context of Amhara region where poor infrastructure and financial resource are major constraints for ISLA. Currently the telecommunication infrastructure is unable to support networking between all Weredas in the region and the central database.

The major constraints in running ISLA are skilled manpower and operational and maintenance costs. Concerning cost recovery, one critical issue for determining whether to include a specific data category is whether users are prepared to pay the price for its gathering, storage, and updating. In the Amhara region both traditional and modern type of registration was initiated by the regional state. The registration is compulsory, in which it is the regional state that plays the major role and covers all costs related to cadastral survey for the first time and for running ISLA. Subsequently, the costs of registration can be recovered more or less through direct user fees such as when land possessors request change of certificate of holding except in case of land consolidation, which is effected free of charge to encourage holders as stated in the law. The other

option for cost recovery is from Map data which in principle should be sold at market price and computerized registration data should be available for use at cost. That will support the sustainability of the land administration system. The major problems to be addressed in improving our land information is strengthening awareness creation to the beneficiary community on the system and provision of technical assistance to Weredas on the process of data capture in the field and its management in the office. Although this is one of the responsibilities of EPLAUA, there is shortage of required staff at the regional level. Lack of trained staff at all levels is the most critical problem that needs to be solved. In other words, it is the experience and education of the people who run the ISLA that determine the success or failure and not the technology used. In order to run ISLA successfully constraints related to finance and human resource should get due attention. Therefore, it is important that the EPLAUA staff should know and understand IT technology such as relational databases and modern clients/server or web technology. In line with this an attempt has been made to establish a group of 4-5 persons in each Wereda EPLAUT who are responsible to run ISLA. On job type of training has been given to the selected Wereda staff by the EPLAUA IT team. This does not mean that the Wereda staff have received extensive training in land related issues and a more specified IT training.

The ISLA developed in the two pilot Weredas is an interim system to handle the basic transactions concerning real properties and holding rights. Currently the major transactions being inheritance, gift, and sub-division of parcels due to divorce, they are traceable. Definitely, when these transactions occur the data needs to be updated. Unfortunately, the request for transferring land rights has been implemented before the land data is transferred to the book of register. So, there is no updated record in the book of register, as observed. In regard to the demand of data maintenance, for example, in one of the focus Weredas, Basso Worana, transaction cases are estimated at: inheritance 300 applicants per year, gifts 116 applicants per year, divorce 80 cases per year. Even in the other focus Weredas the demand exists but there is limitation in organizing the records. The system architecture is a guide that proposes a technical solution concerning what software to work with and how data is transferred from the Wereda to the EPLAUA. Currently all entry and updates of data are done at the source, i.e., Wereda offices. Data is only made available at EPLAUA office for reporting purposes at the moment.

6.2 Lessons to be drawn from establishing ISLA

Forming of the development group is essential but most essential is that the group is committed and actually participates in the process. If somebody disappears, s/he must be replaced. Some of the ISLA development work was too much of one man's consultancy job. A committed group and a responsible person at the authority should be a guarantee that the system usage will be followed up. We have had problems with that.

Having both a manual and a computerized system in parallel does not encourage the staff in the pilot Wereda to use the computer system. In reality, the pilot Wereda staff gave more attention to the field registration of parcel based information by manual means than by entering data into the system. From their response, it is understood that Weredas

wanted to complete the primary level registration as indicated in the region's three-year strategic plan which is up to June 2006. Due to this, entering data into the system seems ignored at the moment. To this end a lesson that can be drawn is that there must be close supervision on the side of EPLAUA. In addition, the system should have been used and a user driven development most likely arises.

Development of ISLA and the register book as well as the book of holding was done in parallel. However, the amount of information entered into ISLA was cut down compared to what is entered into the register books. The reason for this is that it was considered very difficult to update all such information.

During the first registration, information from the field and the farmers can be entered into the raw data collection sheets. This information can be of interest at a later stage to solve disputes or correct mistakes or prevent corruption. This raw data should be kept in such a way that it can not be manipulated. However, all the raw data must not be entered into a register since that will cause updating problems. Updating must be done frequently; at the same time farmers are supposed to register transfers according to the law; otherwise the register will not be up-to-date and will gradually deteriorate

7. Recommendations

Computerized land information system has been introduced into the Amhara Region in order to get the underlying benefits of computerization. In comparing the benefits of computerization of ISLA and its costs, cost may be the limiting factor for its further expansion region-wide. In such a circumstance, the recommendation in the development of region-wide ISLA should be encouraged in a systematic fashion, step by step rather than attempting to do it at once.

Regions should be assisted in the development and implementation of ISLA, which can serve as an invaluable tool in the transformation of rural development. The main obstacle to effective land information may be lack of necessary co-ordination between EPLAUA and CSA, EMA and other stakeholders. To this end ELTAP should support the Federal government and the four Regional states in establishing standardized land information systems and to bring about comprehensive co-ordination at both the technical and institutional levels of data collection and utilization.

We recommend that ELTAP should undertake the initiation of infrastructure development for the dissemination of land information from grassroots to regions and then to national level in order to make policy and decision makers understand the importance of computerizing land information as corporate resource.

Furthermore, ELTAP should arrange regular networking for regional and national concerned staff with the objective of exchanging views and information, training of personnel in IT and management. As it is recommended by the system development specialist detailed training on the following areas is very vital to ensure the sustainability of the system. Training subjects include:

- Microsoft server
- Microsoft Visual Basic Net (dot-net)
- Microsoft SQL server Net (dot-net)
- Land Administration related issues.

This is important in order to improve the existing cadastral system and the development of information as a corporate resource. In regard to the technical issues, many of the more complex systems can take months if not a year for an operator to become fully confident with the system, which may be a heavy investment for EPLAUA. As EPLAUA becomes more familiar with the existing ISLA designed for the two pilot Weredas, so its demand for additional functionality like mortgage, assessed market value and expropriation, which are not treated in the system currently, will grow definitely. Thus systems become more complex and more difficult to learn and operate. So capacity building in IT with its dynamic nature should be given due attention.

It is a novel idea that information about land should be treated as a corporate resource and its use must be maximized. In line with this to utilize land information as a corporate resource, how the potential users of the ISLA such as banks, the institution in charge of land tax collection and other concerned organizations can gain access to it must be addressed, as currently access to ISLA is limited to EPLAUA and EPLAUT.

In Amhara region overgrazing, deforestation and inappropriate agricultural practices account for most of the land degradation and the problem will aggravate if nothing is done to reverse the situation. It is needless to say that these problems have emanated from insecurity of tenure. Considering the seriousness of land degradation caused by insecurity of tenure the Amhara National Regional State prioritizes the issue of land. To administer real property and their holding rights land data related to holders' right, land value and land use are needed. Therefore computerization of cadastral records can offer more efficiency for the implementation of rural land administration activities.

Contrary to the advocates of computerization of information system for land administration, there are opponents justifying their arguments that in many countries, investment in information technology has been driven by each organization's internal need to improve the management of its own resources. In reality, they suggested that computerization does not necessarily improve efficiency – as there is no benefit in computerizing the mistakes and errors of the past. Of course, the opponents of computerization did not deny that computerization can act as a catalyst to improve existing procedures and has often led to external benefits through the provision of better service to the intended beneficiaries. Although computerization of ISLA may be costly in terms of financial resource and skilled man power requirements, its merits and demerits should be assessed from the users' perspective. Therefore, though computerization may be costly it should be in place for the proper administration of real property and their holding rights.

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Annex 1

Fig. 1. Components of a land information system.

